functioning as a reinforcing member bonded to a back surface opposite to an electrode-formed surface of the element 1' with the adhesive 5. A size B2 of the bumper member 4 is larger than a size B1 of the semiconductor element 1', and outer edges of the bumper member 4 protrude more outwardly than outer edges of the semiconductor element 1'. The adhesive 5, since being the resin adhesive having low elastic modulus, bonds the semiconductor element 1' to the bumper member 4 while allowing the element 1' to be deformed.

As shown in Fig. 3, the bumper member 4 including a part code 8 as identification information printed on the top surface of the member 4, and polarizing mark 9 indicative of a mounting direction printed at the corner similarly to a conventional resin-sealed electronic component. In other words, the bumper member 4 has a reverse surface opposite to a bonded surface of the member 4 and semiconductor element 1', and the reverse surface is an applied-surface to which the identification information is applied. Then, a discrete semiconductor device 7 is inverted to have the bumper member 4 face upward, and then is subjected to a taping process to be stored on a tape for supplying electronic components to an automatic-electronic-component-mounting apparatus. Thus, the device 7 can be mounted with the mounting apparatus.

Instead of the semiconductor element 1', a dummy semiconductor device made of a silicon plate having a thickness of 50μm was subjected to a drop test in which the device was dropped from a height of 1m. As a result, damage such as fracture or the like did not occur to the silicon plate at all. According to this fact, it is confirmed that the semiconductor device in accordance with the present embodiment has no problem even if being handled in the same manner as for an ordinary electronic component. Therefore, the semiconductor device 7 can employ an extremely thin

semiconductor element, which is hardly handled upon being used in a conventional resin-sealed device, because the device 7 has a simple structure in which bumper member 4 is simply bonded to the semiconductor element 1' with the adhesive 5.

Mounting the semiconductor device 7 will be explained hereinafter with referring to Fig. 4A through Fig. 4C. As shown in Fig. 4A, the device 7 has a top surface of the bumper member 4 sucked and held by a mounting head 10, and then, the device 7 is positioned above the substrate 11 by the head 10. After aligning bumps 2 of the device 7 with respective electrodes 12 on the substrate 11, the mounting head 10 is then lowered to mount each bump 2 of the semiconductor element 1' on each electrode 12.

Subsequently, the substrate 11, with being heated, has the electrodes 12 bonded to the bumps 2 by soldering. As described above, the mounting head 10 holds the bumper member 4 as the holding member while the semiconductor device 7 is handled to be mounted on substrate 11. The bumps 2 may be bonded to the respective electrodes 12 by a conductive resin adhesive.

In an assembly including the semiconductor device 7 mounted on the substrate 11, the device 7, for being fixed to the substrate 11, has the bumps 2 bonded to respective electrodes 12 of the substrate 11 as a workpiece. The semiconductor element 1' is thin and is easily bent, and the low elastic modulus material easy deformed is used for the adhesive 5. Therefore, as shown in Fig. 4C, when the substrate 11 is deformed by an external force after the mounting, only the semiconductor element 1' and an adhesive layer of the adhesive 5 is deformed in response to the deformation of the substrate 11.

Moreover, since the extremely thin semiconductor element having a thickness of 100μm or less in the semiconductor device in accordance with this embodiment, a stress on the bumps 2 due to a difference between thermal

expansion coefficients of the element 1' and substrate 11. A conventional electronic component (semiconductor device) having a bump, since employing a thick semiconductor element accepts an excessive stress on the bump enough to be able break the bump. For this reason, an underfill resin or the like is needed for reinforcing between the electronic component having the bump and a substrate. However, the extremely thin semiconductor element 1', after being mounted, reduces the stress on a junction of the device 7 and substrate 11 without reinforcement such as the underfill resin. In addition, the semiconductor device has a simple package structure including the semiconductor element 1' and bumper member 4 both simply bonded with the adhesive 5, thus having an ensured reliability after the mounting.

(Exemplary Embodiment 2)

Fig. 5A through Fig. 5D and Fig. 6A through Fig. 6D illustrate processes in a method of manufacturing a semiconductor device in accordance with an exemplary embodiment 2 in order of procedure of the method.

In Fig. 5A, bumps 2 for external connections are formed on a top surface of a semiconductor wafer 1 including plural semiconductor elements formed therein. A sheet 6 is then attached to an undersurface of the wafer 1. As shown in Fig. 5B, the wafer 1 is diced while being held by the sheet 6 to from grooves 1a along respective borders of semiconductor elements 1'. A reinforcing sheet 3 for a thinning process is performed to bump-formed surfaces of the elements 1', and then, the sheet 6 is removed. Then, the elements 1', upon being reinforced with the sheet 3, has a set of back surfaces opposite to the bump-formed surfaces 1' thinned. Each element 1' is thinned to a thickness of about 50μm and separated from one another along diced grooves 1a.